UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
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SUBJECT: Technical Memo regarding Soil-to-Groundwater Soil Screening Level decision at the Venezia Enterprises Nazareth Trucking Terminal

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TO: File

THRU: Paul Gotthold

This technical memo discusses the Environmental Protection Agency's (EPA's) review and decision on appropriate soil-to-groundwater (S-GW) soil screening levels (SSLs) for trichloroethylene (TCE); cis-1,2-dichloroethylene (DCE); carbon tetrachloride (CT); and benzene (contaminants of concern (COCs)) at the Venezia Enterprises Nazareth Trucking Terminal (Facility) located at 3987 Easton-Nazareth Road Nazareth, PA 18064.

To satisfy its Corrective Action obligations and to address several areas of concern (AOCs), the Facility entered into the One Cleanup Program between EPA and the Pennsylvania Department of Environmental Protection (PADEP). Sampling results taken near former hazardous waste lagoons located centrally within the Facility boundary revealed COCs above PADEP S-GW Statewide Health Standards (SHSs). These COCs also exceed EPA's Risk-based and MCL-based SSLs for protection of groundwater. EPA consulted the July 1996 Soil Screening Guidance to determine the applicability of these SSLs to the Facility. EPA's SSG self describes the SSLs as generic and conservative since the default values are designed to be protective at most sites across the country. Therefore, EPA used the procedures and calculations provided in the User's Guide, the Technical Background Document (TBD) and the 2002 Supplemental Guidance For Developing Soil Screening Levels For Superfund Sites Appendices to determine if more site-specific SSLs still revealed that the COCs were a threat to human health or the environment.

The generic migration to ground water pathway equations assume an infinite source. SSLs developed using these equations may violate mass-balance for certain contaminants and site conditions (e.g., small sources). The former lagoon system was eliminated in November 1973 and area of contamination is conservatively estimated to be around 0.25 acres. Therefore, the Facility violates these two generic conditions. To address this concern, EPA has incorporated simple mass-limit models for these pathways assuming that the entire volume of contamination either volatilizes or leaches over the duration of exposure and that the level of contaminant at the receptor does not exceed the health-based limit. These models and all parameter definitions are found in Section 2.6 of Part 2: Development Of Pathway-Specific Soil Screening Levels of the TBD. EPA initially used Eq. 49 and the calculations and results are listed below.

$C_t = (C_w \; x \; I \; x \; ED)/(\rho_b \; x \; d_s)$ Eq. 49

Typical ρ_b of clay is 1.1-1.3 kg/L (1.3 kg/L was used as it equates to a more conservative result)

Average d_s is 4 m

I is the overall average of Northeast taken from Table 6

TCE:

$C_t = ((.005x20) \; x \; 0.22 \; x \; 70)/(1.3 \; x \; 4) = 0.296$ mg/Kg

1,2-DCE:

$C_t = ((.07x20) \; x \; 0.22 \; x \; 70)/(1.3 \; x \; 4) = 5.2$ mg/Kg

CT:

$C_t = ((.005x20) \; x \; 0.22 \; x \; 70)/(1.3 \; x \; 4) = 0.296$ mg/Kg

benzene

$C_t = ((.005x20) \; x \; 0.22 \; x \; 70)/(1.3 \; x \; 4) = 0.296$ mg/Kg

COC	Average AOC concentration (mg/Kg)	Eq. 49 result (mg/Kg)
TCE	3.412	0.296
1,2-DCE	3.942	5.2
CT	1.02	0.296
benzene	0.7305	0.296

As can be seen, by using this equation 1,2-DCE does not to warrant any further consideration as a threat to human health or the environment from migration to groundwater. But average concentrations of TCE, CT, and benzene results do exceed their calculated S-GW SSLs using Eq. 49. However, this equation uses a default dilution attenuation factor (DAF) of 20 to account for contaminant dilution and attenuation during transport through the saturated zone to a compliance point (i.e. that the contamination intersects the groundwater). Considering the shallow depth of the identified contamination and the noted depths to groundwater of 80-85 feet, EPA does not believe this DAF is completely appropriate.

Further consulting of the SSG shows that to develop the DAFs, EPA performed modeling efforts to be considered in the selection of Default DAFs. One model, *EPA's Composite Model for Leachate Migration with Transformation Products* (EPACMTP), was able to take into account adsorption in the unsaturated and saturated zones and can simulate chain decay, thus allowing the simulation of the formation and the fate and transport of daughter (transformation) products of degrading chemicals. EPA has extensively verified both the unsaturated and saturated zone modules of the EPACMTP against other available analytical and numerical models to ensure accuracy and efficiency. Both the unsaturated zone and the saturated zone modules of the EPACMTP have been reviewed by the EPA Science Advisory Board and found to be suitable. Furthermore, to gain further information on the national range and distribution of DAF values, EPA also applied the simple SSL water balance dilution model to groundwater sites included in two large surveys of hydrogeologic site investigations. These were American Petroleum Institute's (API's) hydrogeologic database (HGDB) and EPA's database of conditions at Superfund sites contaminated with DNAPL. Tables 5 and 7 show the results of these modeling efforts with DAF values of 644 (EPACMTP 90th percentile for 0.23 acres) and 240, 292, and 336 (HGDB, total, and DNAPL 90th percentile for 0.5 acre sources).

Therefore, to be on the conservative side, EPA used a DAF of 240 (recall this is for a 0.5 acre source and the Venezia Facility is conservatively estimated to be about 0.25 acres) to recalculate the SSLs for TCE, CT, and benzene.

TCE, CT, and benzene:

$C_t = ((.005x240)\ x\ 0.22\ x\ 70)/(1.3\ x\ 4) = 3.55$ mg/Kg

COC	Average AOC concentration (mg/Kg)	Eq. 49 result (mg/Kg)
TCE	3.412	3.55
CT	1.02	3.55
benzene	0.7305	3.55

Now as can be seen, by using a more appropriate, yet still conservative DAF, neither TCE, CT nor benzene exceed the recalculated SSLs. Based on the information presented in this technical memo, EPA does not believe the COCs warrant any further consideration as a threat to human health or the environment from migration to groundwater.